REMARKS

Claims 1 and 3 -10 are pending and stand rejected.

Claims 7-9 are withdrawn.

Claim 1 has been amended, to describe the ratio of polyamide (PA) to polyolefin (PO) in the polyamide/polyolefin blend. Support for this amendment is found on page 14, lines 11 to 14 "Usually, it is sufficient for the proportion of polyamide of the polyamide (A)/polyolefin (B) blend containing carbon nanotubes to be at least 40% and preferably between 40 and 75% by weight so that there is a polyamide matrix." Claim 1 was also amended to include the limitations of claim 3. Claim 3 was cancelled.

Claim 1 was also amended to state "wherein said carbon nanotubes concentrate in the polyamide."

INVENTION

Applicant has surprisingly found that carbon nanotubes preferentially concentrate in the polyamide portion of a polyamide/polyolefin blend. This means that the conductive properties of the carbon nanotubes at a higher concentration can be exhibited in the polyamide portion of a blend, even though the over-all concentration in the PA/PO blend can be much lower – saving cost. The advantage found in the present invention can be seen in Figure 1 of the present application. At the same loading level of carbon nanotubes, the polyamide/polyolefin blend has a significantly lower resistivity (better conductivity) than a pure polyamide. At a loading level of 4% nanotubes the pure PA- had a Resistivity of about 10^{13} while a 4% loading of nanotubes in the PA/PO blend had a resistivity of about 10^{9}. At 6% nanotube loading, the PA-6 had a Resistivity of about 10^{10} – still not as good as the 4% loading in the PA/PO blend. This shows that the polyolefin/polyamide blend of the invention provides a better anti-static effect at a lower loading than in PA alone – an unexpected and certainly not an additive effect. The effect of the blend is not obvious and is not taught or suggested by either cited reference.

35 U.S.C. §112, 1st

Claims 1, 3-6 and 10 stand rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner contends that the specification, as originally filed, fails to support the "90 percent by weight" and "10 percent by weight" contents defining the polyamide and polyolefin components, respectively. Claim 1 has been amended to state " said polyamide portion of the polyamide/polyolefin blend is from 40 to 75 percent by weight of said blend, and the polyolefin portion of the polyamide/polyolefin blend is from 25 to 60 percent by weight."

Claim 10 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Specifically the Examiner cites:

a) it is unclear as to whether of not components I) and ii) are both required.

b) the metes and bounds of the "elastomer" are indeterminate in scope.

c) It is unclear as to what is meant by "cografted".

a) Components i) and)ii are both required elements of claim 10. Claim 10 states "i) a high...(HDPE); and ii) a blend ... The term "and" means that element i) and ii) are bothe required.

b) An elastomer as related to polymer (C2) is defined on page 16, lines 4-15 of the original specifaction in such a means as one of skill in the art would understand the meaning.

c) "Cografted" is defined in the original specification on page 1, lines 20-30 and page 17, lines 8-13 which states that cografting involves "to graft a grafting monomer onto a blend of (C1) and (C2)" polymers. In other words "cografting" is having a polymer blend to which a grafting monomer is grafted onto the polymer mixture.

35 U.S.C. §§102(b)/ 103(a)

Kurasawa et al.

Claims 1 and 3-6 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kurasawa et al et al, US

6,608,133. The '133 reference fails to teach all of Applicants claim elements and limitations, and therefore fails to present a *prima facie* case of anticipation or obviousness. Specifically, the '133 reference fails to recognize the surprising synergistic advantage discovered by Applicant that in a blend of 25-60 wt% polyolefin and 40-75 wt% of polyamide with 0.1 to 10% of carbon nanotubes, that the carbon nanotubes preferentially concentrate in the polyamide portion of a polyamide/polyolefin blend. This means that the conductive properties of the carbon nanotubes at a higher concentration can be exhibited in the polyamide portion of a blend, even though the over-all concentration in the PA/PO blend can be much lower – saving cost.

The '133 reference describes the use of carbon fibrils in a matrix that can include polyamides or polyolefins. The '133 reference also includes in the examples blends of thermoplastic resins, including Table 5 (Examples 10-13) showing a polyamide matrix with polyphenylene ether. The '133 reference fails to recognize the improvement in properties related to the concentration of the carbon fibrils in the polyamide layer as a result-effective variable, and therefore it cannot be optimized by routine experimentation.

While the '133 reference teaches the use of carbon fibrils, and the use of a polyolefin OR a polyamide resin, and the use of a polyamide/polyphenylene ether blend; there is no teaching or suggestion to use applicant's claimed polyamide/polyolefin blend for its synergistic effect of the carbon nanotubes concentrating in the polyamide layer. Thus the '133 reference fails to present a *prima facia* case of either anticipation of obviousness. There is no teaching or suggestion of any synergistic effect resulting in carbon nanofiber concentration in the polyamide in a polyamide blend, nor is there a teaching or suggestion of using a polyamide/polyolefin blend as the resin.

Jadamus in view of Nakajima

Claims 1 and 3-6 stand rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jadamus et al et al, US 6,090,459, in view of Nakajima (US 5,376,712). The '459 reference fails to teach all of Applicants claim elements and limitations, and therefore fails to present a *prima facie* case of anticipation or obviousness. Specifically, the '133 reference fails to recognize the surprising synergistic advantage discovered by Applicant that in a blend of 25-60 wt%

polyolefin and 40-75 wt% of polyamide with 0.1 to 10% of carbon nanotubes, that the carbon nanotubes concentrate in the polyamide. The '459 patent teaches a multi-layer plastic in which the inner layer may be a polyamide, polyolefin, polyester or fluoropolymer. The polyamide may be impact modified with an ethylene-propylene copolymer (Col. 3, line 9).

The '459 teaches a multi-layer plastic in which the inner layer may be a polyamide, polyolefin, polyester or fluoropolymer. The '479 reference does not teach or suggest blends of a polyamide and a polyolefin, and certainly does not teach or suggest a synergistic relationship of a polyamiude/polyolefin/carbon nanotube blend where the nanotubes concentrate in the polyamide as claimed by Applicant. When describing a polyamide layer, the '459 reference notes that the polyamide may contain up to 40% of other suitable thermoplastics including polycarbonate, acrylonitrile/styrene/butadiene copolymers, acrylonitrile/styrene/acrylate copolymers, acrylonitrile/styrene copolymers, or polypropenylene ethers. (Col. 2, line58 to Col. 3, line 6). Nothing resembling a polyolefin is taught or suggested!

Likewise, when describing the use of a polyolefin as the inner layer, the '459 reference describes polyolefins and copolymers of polyolefins only, and NO Blends. (Col. 3. lines 24 – 48).

Applicant's claims not only claim a PA/PO blend, which is not taught or suggested by the '459 reference, but Applicant's amended claims require a specific range of ratios for the PA and PO components of the blend. While the '459 reference teaches at least 60% PA, there is no teaching or suggesting of a blend having10 – 60 percent of PO.

Both the polyamide and the polyolefin layers in the '459 reference may be impact modified with standard impact modifiers. As one in the art would understand, the use of small amounts of impact modifier particles is in addition to, and very different from, the polymer blend. Thus a polyamide that may be impact modified with a polyolefin-containing impact modifier IS NOT the same, nor would it teach or suggest to one in the art, a blend of a polyamide and a polyolefin as the polymer blend. Even if one were to mistake an impact modifier for a polyolefin blended with the polyamide, there is no teaching or suggestion of using 10 to 60 weight percent of polyolefin.

All examples in the '459 reference describe polyamide or polyester layers – none being blended with any other thermoplastic resin. The Examples contain NO Blends of any kind, and show no use of polyolefins – thus clearly not teaching or suggesting any blend, much less a blend of a polyamide and polyolefin. The Examples instead Teach Away from Applicant's claims by demonstrating that the problem can be solved with a polyamide Without polyolefin in the blend. One in the art would find no teaching or suggestion in the '459 reference to inspire one to arrive at Applicant's claims.

Since the '479 reference failed to recognize a polyamide/polyolefin/nanotube combination, as result effective, this property could not be optimized by routine experimentation. There is no teaching or suggestion in the '459 reference of the advantage Applicant has found that the nanotubes concentrate in the polyamide – allowing for the use of fewer nanotubes in the over-all thermoplastic for the same antistatic properties. Since the nanotubes concentrate in the polyamide, the polyamide/nanotube concentration providing the antistatic properties is the same as a much larger loading of nanotubes is a pure polyamide layer - making the product less expensive. The result is that a lower level of carbon nanotubes is required in the blend, than in either a pure polyamide, or a pure polyolefin, for the same antistatic properties.

Nakajima

The Nakajima reference is cited to show that a polyamide can be impact modified with up to 50 parts of an impact modifier. The impact modifier taught is based on acrylonitrile alkyl acrylates, or a combination thereof. As stated above, one of skill in the art knows that elastomer (rubbery) impact modified polyamides are not the same as a blend of a polyamide and a polyolefin thermoplastic. The '133 reference lists as thermoplastics polyamide, and polyolefins (column 2, line 25-29). The '712 reference describes rubbery polymers. **An impact modifier is not a thermoplastic.** Whether the elastomer is the rubbery polymer of the '712 reference, or the impact modifier of the '459 reference, it is not the thermoplastic of Applicant's invention.

35 U.S.C. §103

Jadamus in view of Kurasawa

Claims 1, and 3-6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over US 6,090,459 in view of US 6,608,133.

As described above, the '459 reference fails to teach or suggest Applicant's claimed invention of the surprising synergistic advantage discovered by Applicant that in a blend of 25-60 wt% polyolefin and 40-75 wt% of polyamide with 0.1 to 10% of carbon nanotubes, that the carbon nanotubes preferentially concentrate in the polyamide portion of a polyamide/polyolefin blend. The '133 reference fails to correct the deficiencies of the '459 reference, as described above. Neither reference teaches of suggests a polyamide/polyolefin blend with carbon nanofibrils, and neither reference teaches of suggests the synergistic effect in which the carbon nanofibrils concentrate in the polyamide layer. Therefore, neither of the '133 or the '459 references, alone or together present a *prima facie* case of obviousness.

Dupire in view of Kurasawa

Claims 1, and 3-6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over US 6,331,265 in view of US 6,608,133.

As, stated in Applicant's previous responses, the '265 reference fails to teach all of Applicants claim limitations, and therefore fails to present a *prima facie* case of obviousness. Specifically, Applicant claims a composition of a polyamide/polyolefin blend of 40-75 wt % PA/ 15-60 wt % PO, containing carbon nanotubes, while the '265 patent (to Applicant Company) teaches a method using only a single polymer matrix.

The Examiner's premises that the total amount of polymer matrix and total amount of nanotubes used in the composition comprising the polyamide/polyolefin combination would be the same as in the composition comprising either polyamide or polyolefin alone. In deed this is the aspect in which Applicant's results were unexpected and unobvious. Applicant has found that the nanotubes concentrate in the polyamide – allowing for the use of fewer nanotubes in the over-all thermoplastic for the same antistatic properties. Since the nanotubes concentrate in the polyamide, the polyamide/nanotube concentration providing the antistatic properties is the same as a much larger loading of nanotubes is a pure polyamide layer - making the product less expensive. The result is that a lower level of carbon nanotubes is required in the blend,

than in either a pure polyamide, or a pure polyolefin, for the same antistatic properties. In other words, the polyolefin serves to dilute the total amount of polyamide – yet since the nanotubes concentrate in the polyamide the polyamide/nanotube concentration remains about the same as for pure polyamide. With less overall polyamide, a fewer nanotubes are required in the total polyamide/polyolefin blend to maintain the polyamide/nanotube concentration – providing a less expensive means of providing a similar level of antistatic properties.

The Kurasawa reference fails to heal the deficiencies of the Dupire reference as no polyamide/polyolefin blend is taught or suggested, and no concentration of carbon nanotubes in the polyamide layer is taught or suggested.

Since the cited references fail to present a *prima facie* case of anticipation orobviousness over the claims as amended, Applicant believes that the reasons for rejection have been overcome, and the claims herein should be allowable to the Applicant. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,

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